ment is conducted so that during the dilatation of the air in A and $A_1$ the index of the differential thermometer $\gamma$, which combines both instruments, is kept *constant.* Suppose then a beam of heat rays to fall upon a thin piece of platinum foil[1] in A *through the glass wall.* The immediate effect of radiation is to elevate the temperature of the air in A, but as an increase of only 0·0016 of a centigrade causes a displacement of the differential index $\gamma$ of 1 mm.,[2] it is easy for the operator to compensate this tendency and transform the heat into work by lowering the graduated tube D, which makes the air in A and $A_1$ expand. This expansion is *isothermic* in both, because volume and pressure varies in the same way in A as in $A_1$, where it, as shown formerly, follows Mariotte's law.[3] The rate of expansion of the air is indicated by the rise of the mercury in the calibrated tube D. The sensibility of the differential index is so great that it requires a very steady hand to regulate the movement of D so that the index keeps constantly at its initial point, without making greater excursions to either side than 1 or 2 mm. Every irregularity in the movement changes the isothermic expansion into adiabatic dilatation or compression. I therefore prefer to regulate the sinking of D by means of a screw. During the experiment A must be protected by isolating screens, &c., from outward disturbing thermal influences. I think I have realised this in a satisfactory way, but as a detailed account of the arrangement would be too long, I must reserve the complete description for a future paper.

Lastly I will mention some examples of determinations of the radiant heat emitted by a regulation gas-burner at 22·5 cm. distance from A. The radiation was admitted through a screen with an opening of $4\frac{1}{2} \times 2\frac{1}{2}$ cm. The initial volume of the air in A[4] was 622·22 c.c. The pressure was brought to 760 mm. Experiment I. was made at noon, II. in the afternoon of the same day.

Experiment I.—Increase of volume by expansion during 6 minutes = 185·9 c.c. Mechanical equivalent of the radiation during 6 minutes = 1·680 M.K°. Mechanical equivalent of the radiation during 1 minute = 0·280 M.K°.

Experiment II.—Increase of volume, &c., during 5 minutes = 158·5 c.c. Mechanical effect of radiation in 5 minutes = 1·459 M.K°. Mechanical effect of radiation in 1 minute = 0·291 M.K°.

I have measured in this way the mechanical effect of radiations, the caloric energy of which was only 0·08 of a gramme-calorie in the minute. *This method is free from every kind of correction.* It is obvious that, by means of a thin test-tube hermetically inserted into A, calorimetric determinations of specific heat, &c., could be made, but I have not yet arranged the apparatus for this purpose.

OTTO PETTERSSON

Stockholms Högskolas Laboratorium, June 25

## *NOTES*

THE Government have directed Dr. Klein, F.R.S., and Dr. Heneage Gibbes, to proceed to India to pursue a scientific inquiry into the nature of cholera. It is understood that these gentlemen will act in conjunction with the Commission nominated a few weeks ago by the Indian Government for the same object.

AT the meeting of the Council of the Marine Biological Association on Friday, July 25, Prof. Moseley in the chair, the names of Prof. Allman, F.R.S., and Sir John St. Aubyn, Bart., M.P., were added to the list of Vice-Presidents, and Mr. Spence Bate of Plymouth was elected on the Council. It was decided that, provided certain arrangements promised by a committee of the Town Council of Plymouth were carried out, the Association should proceed to erect its first laboratory on Plymouth Sound. Plymouth is not only the best position for the laboratory on account of its natural features, but the local committee has offered to the Association a free site on the seashore and a subscription of 1000*l.* A vote of thanks to H.R.H. the Prince of Wales for having become the Patron of the Association was carried. The financial prospects of the Association were reported as highly satisfactory. The building of the laboratory will probably be commenced in the spring.

THE eighth International Medical Congress is to be held in Copenhagen from August 10 to 16. President, Prof. Dr. P. L. Panum; Secretary, Dr. C. Lange, both of Copenhagen. Among the most eminent of the 658 medical men who have engaged to attend are:—Prof. Lister, Sir William Gull, Bart., Prof. Dr. L. Pasteur, Prof. Paul Bert, and Prof. Dr. R. Virchow.

THE Congress of the British Medical Association opened in Belfast on Tuesday. Prof. Canning directed his presidential address mainly to an analysis of the origin and causes of the spread of epidemic diseases.

THE prospectus has just been issued of the new "Società di Geografia ed Etnografia," founded in Turin in anticipation of the Italian Geographical Congress, which meets in that city on August 15. The Congress is a passing event, but the Society has probably a brilliant career before it, established as it is under the auspices of Prof. Guido Cora, its first President. The well-known *Cosmos* of the distinguished geographer becomes the authorised scientific *Journal* of the Society, a happy arrangement which cannot but prove mutually beneficial. In other respects everything is for the present provisional, and the council, including besides Sig. Cora such names as those of Luigi, Schiaparelli, Enrico Morselli, and Alessandro di Cesnola, holds office only till the beginning of next year, when the statutes will be definitely settled, and a permanent administration established. Meantime it is satisfactory to find that ethnology, a branch of geographical science so strangely neglected by existing geographical institutes, is to receive all due prominence and encouragement. Another important feature is the attention to be paid to commercial and industrial geography, especially as regards Italy in its relations with foreign countries. This idea also, *mutatis mutandis*, might be advantageously adopted by similar learned bodies elsewhere.

THE *Bollettino* of the Italian Geographical Society for July publishes the circular, regulations, and programme of the first Italian Geographical Congress, which meets in Turin from the 15th to the 19th of next August under the presidency of the President of the Italian Geographical Society. All except honorary members to be specially named will be expected to contribute towards the expenses sums varying from ten to thirty francs. In return they will have free access to all the scientific gatherings, and will be entitled to a copy of the *Proceedings* of the Congress. There will be two Sections—a Scientific and Commercial, and questions will be discussed in connection with mathematical, physical, ethnographic, political, economic, and historic geography. Amongst the subjects proposed for discussion are the following:—"What ethnological conclusions are to be drawn from the more recent anthropological and philological data, regarding the indigenous populations of East Africa?" "Considering the part already taken by Italy in scientific exploration in the Polar seas, what are the best means of organising an independent Italian expedition to the Antarctic regions?" "On the need of preparatory schools for training travellers in the work of exploration." "On the best means of turning to better account for science and commerce the work of Italian explorers." "On the importance of establishing commercial stations in the Barbary States as a means of gaining access to the Sudan"; and "On Geographical Education."

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[1] It is blackened in the following way. It is galvanically coated with a thin layer of metallic copper, and afterwards heated in a current of oxygen. This arrangement gives most sensitive indications.

[2] This is the case in the apparatus constructed by the author. The index there consists of a small drop of coloured alcohol. If $H_2SO_4$ is substituted for the alcohol, the sensibility of the apparatus is lessened considerably.

[3] In my last constructed apparatus I have substituted a vessel of thin copper instead of the upper part of the glass vessel $A_1$. This arrangement answers the purpose excellently.

[4] And also in $A_1$, which is of the same size. This condition is, however, by no means indispensable. $A_1$ can be greater or smaller than A, only the dimensions of A and $A_1$, B and $B_1$ are proportional to each other.

Mr. Rivett-Carnac sends us a handy reprint of his valuable paper "On the Stone Implements from the North-Western Provinces of India," originally published in the *Journal* of the Asiatic Society of Bengal. The striking resemblance that the remains of the Palæolithic and Neolithic ages bear to each other wherever found in the Old and New Worlds, has often been commented on, and receives fresh illustration from the three plates of celts, arrowheads, hatchets, hammers, weights, and other objects, accompanying the brochure. These specimens are lithographed from photographs, and all made to scale, whereby their value is greatly enhanced for the comparative study of similar objects elsewhere. It is pleasant to learn that the best specimens have all been presented to the British Museum, while casts of some unique types peculiar to India have been made for the chief museums of India, Europe, and America, and even for some private persons interested in prehistoric research.

Even in Rome the aërial disturbances caused by the Krakatoa explosion were clearly indicated on the registering barometers. On examining the curves of the Richard barograph Prof. Tacchini found that, although the daily curves followed regularly in accordance with the normal barometrical conditions in Europe, those of August 27, 28, and 29, 1883, betrayed slight indentations, which, without changing the daily record of the pressure, show that for short intervals its precision oscillated abruptly, owing to the passage of the above-mentioned waves. These barometrical oscillations occurred at the following times:—12.7 of the 27th, 5.6 a.m. of the 28th, 1.48 a.m. of the 29th, and, lastly, about 4 p.m. of the same day. The time of the volcanic explosion was determined by Tacchini by the report of S. Raffo, captain of the Genoese brigantine the *Adriatic*. S. Raffo states that during the night of August 26–27 continual peals were heard, and that at eight o'clock next morning he heard one of extraordinary violence, accompanied by a shock to the vessel, which was then in 10° S. lat. and 105° E. of Greenwich. Tacchini accordingly concludes that the time of the explosion corresponded with 1.30 a.m. of the 27th at Rome. From these data he finds that the wave reached Rome from Krakatoa by the west, leaving the volcano at a velocity of 277 m. per second, and that moving in the opposite direction at a velocity of 296 m. He further calculated by the observations made at Rome that the complete atmospheric circuit round the globe was effected by the east, leaving Rome at a velocity of 295 m., and of 318 m. by the west. Captain Raffo has forwarded to Rome a quantity of the dust collected on board the ship on that day.

We learn from *El Liberal* of Madrid, July 23, that D. Auguste Arcimis has been observing sunset phenomena very similar to those witnessed last autumn and winter. He has besides noticed an extremely brilliant silver-white corona around the sun, having a horizontal diameter of about 48°.

The Afghan Frontier Commission will, we are glad to learn, include a geologist and native botanist, as well as three surveyors. But, as Mr. Sclater suggests in the *Times*, it is to be hoped that the scientific staff will also include a zoologist or at least a zoological collector. Mr. Sclater writes:—"The country to be passed through by the Afghan Frontier Commission, although probably in the main part bare and arid, is of the deepest interest to zoologists, as being situated nearly on the boundaries of the Palæarctic and Oriental regions. The numerous Russian and American Surveys which have been sent out of late years with similar objects have always given a place in the scientific staff to zoology as well as botany and geology. There is no reason, it seems to zoologists, why our Government should not follow such an excellent example, especially when there will be no difficulty among the numerous Indian officers who are now interested in zoology in finding a suitable person. Let me, therefore, express a hope in the name of British naturalists that a zoologist will be added to the 'scientific staff' of the Afghan Frontier Commission."

We are glad to notice that the new St. Paul's School at Hammersmith includes physical and chemical laboratories.

In a lecture on the Olympic Festival by Dr. A. Emerson at Johns Hopkins University, the lecturer stated that in the Olympic games uniform training, early registration, and fair play were required of the athletes, under penalty of exclusion, or, if fraud was discovered too late, of heavy fines. Dr. Emerson gave the following as the ancient and modern records of running and leaping:—

Day's run: Good Greek record, 150 km.;
Good modern record, 168 km.
Long running jump: Best Greek record, 55 feet;
Best modern record, 49 feet (Engl.) 3 inches.

As the victors in the horse-races, Dr. Emerson stated, were the registered owners of the animals, such victories could be and often were won by women.

Mr. H. M. Stanley arrived in England from the Congo on Monday.

The Bangkok Correspondent of the *Times* telegraphs that Mr. Holt Hallett and his party have reached Bangkok after an arduous expedition, lasting five months and thirteen days, from Moulmein to Bangkok through North Siam. Mr. Hallett succeeded in reaching his destination, though severely fatigued. He will return and spend one month in England, and it is hoped that the sea voyage will recruit his health. On his arrival in London he will submit a preliminary report to the Chambers of Commerce and the Geographical Society, and will return and continue the surveying operations in November. The work completed comprises the surveying of over 1500 miles, the determination of the position of the Shan ranges, and a large series of observations on the vocabularies of the aboriginal races and the histories of the several Shan States. A mass of information throwing light on the interior of Indo-China, especially of North Siam, was gathered. The reception of the expedition was from first to last excellent. This fact was due mainly to the favourable attitude of the natives and the tact and conciliation of the leader.

The Normanic coast of the Kola peninsula will be visited this summer by several explorers. MM. Enwald and Edgren will investigate its natural history; M. Kushcleff the fishing along the coast; M. Hartzenstein has undertaken researches into the fauna and flora of the neighbouring sea; M. Istomin is engaged in ethnographical researches; and M. Abels, of the Central Physical Observatory, is now at Archangel, in order to establish meteorological observatories in the north.

At Forio, in the island of Ischia, a powerful shock of earth quake was felt on the 23rd inst. The tremor was proceeded by loud subterranean rumbling like thunder, or the roar of artillery. The exact time when the event took place was twenty minutes to one o'clock p.m. Fortunately, the phenomenon lasted but momentarily, and passed off without doing any material damage to property, or causing any loss of life. An earthquake also occurred at Massowah on the 24th. Nearly all the houses in the town were destroyed or damaged by the shock. All the ships in the harbour were seen to rock violently.

The employment of acupuncture and cauterisation by Chinese doctors forms the subject of an article in one of the last numbers of the *North China Herald*. A native public writer not long since claimed that a skilful physician in this department of medicine could cure such diseases as imbecility, fits, cholera, &c. The principle of cauterisation is simply that of counter-irritation; and the English writer bears personal testimony to its efficacy in the case of a slight sunstroke, although the operator was a simple Manchu peasant, and instrument a couple of copper coins. Very extraordinary cures are attributed to acupuncture by the Chinese. It is first performed in the hollow of the elbow of each arm. If the puncture draws blood there is no danger, but if no blood appears the case is regarded as very grave. But before abandoning the sufferer, puncture of the abdomen is tried. Seizing a handful of flesh, the operator drives the needle right through it, and then draws it backwards and forwards a few times. If the patient manifests any sense of pain, or if any blood is drawn, a poultice of eggs and buckwheat flour is applied over the puncture, and recovery is regarded as almost certain; but if no pain is felt and no blood flows, the case is declared hopeless, and the sufferer is left to die. The case is then quoted of a young Chinese, educated abroad, who was attacked with cholera; his extremities became cold, and cramp set in in a somewhat alarming manner. The barber-surgeon who was called in commenced by running a needle into the pit of the patient's stomach, a jet of very dark blood following; he then punctured the calf, the two breasts, and the forehead of the sufferer, freeing a certain quantity of blood at each prick. The relief is said to have been instantaneous, and in two days recovery was complete. The Chinese explanation of this treatment is that, when the blood is in the poisoned condition which induces the choleraic symptoms, it becomes thick, and accumulates in certain portions of the body. A clever surgeon knows exactly how to put his finger on the particular spots, and, by skilfully "opening the mouth of the heart," as the operation is called, sets free the poisoned fluid which causes all the mischief. It is noteworthy that faith in the efficacy of this mode of treatment is not confined to the masses, but is shared by Chinese who have been abroad and have had ample experience of Western medical practice.

MR. JAMES HOPPS, Indian Engineering College, Cooper's Hill, writes us with regard to his paper on the electric resistance of metals, read before the Physical Society (NATURE, vol. xxx. p. 283), that an *increase* of resistance on *uncoiling*, and a *decrease* on *coiling* takes place with lead, copper, German silver, aluminium, and magnesium, and also during the first few operations on soft iron. An *increase* almost invariably follows coiling and uncoiling with zinc, but the effects of coiling vary from $\frac{1}{2}$ to $\frac{1}{20}$ of the effects of uncoiling. The full paper will appear in the Society's *Proceedings*.

THE additions to the Zoological Society's Gardens during the past week include a Malbrouck Monkey (*Cercopithecus cynosurus* ♂) from West Africa, presented by Mr. J. H. Harling; a Cape Sea Lion (*Otaria pusilla*) from South Africa, presented by Mr. John Hunt; two Daubenton's Curassows (*Crax daubentoni* ♂ ♀) from Venezuela, a Common Guinea-Fowl (*Numida meleagris*), British, presented by Mr. W. Burch; two Indian Kites (*Milvus govinda*) from Eastern Asia, presented by Mr. W. Jamrach; a Barn Owl (*Strix flammea*), European, presented by Mr. G. H. Garrett; three Angulated Tortoises (*Chersina angulata*), two Geometric Tortoises (*Testudo geometrica*) from South Africa, presented by the Rev. G. H. R. Fisk, C.M.Z.S.; two Smooth Snakes (*Coronella lævis*), European, presented respectively by Mr. W. H. B. Pain and Mr. F. H. Jennings; two Black-tailed Deer (*Cariacus columbianus* ♂ ♀) from North America, two White-backed Piping Crows (*Gymnorhina leuconota*) from Australia, two Common Cormorants (*Phalacrocorax carbo*), British, deposited; two Red-capped Parrots (*Pionopsitta pileata*) from Brazil, a White-bellied Sea-Eagle (*Haliætus leucogaster*) from Australia, a Mohr Gazelle (*Gazella mohr* ♀) from North Africa, a Violet-necked Lory (*Eos riciniata*) from Moluccas, a Black Tortoise (*Testudo carbonaria*), a Common Boa (*Boa constrictor*) from South America, two Electric Eels (*Gymnotus electricus*) from British Guiana, purchased; three Elliot's Pheasants (*Phasianus ellioti*), bred in England; a Mule Deer (*Cariacus macrotis*), a Mesopotamian Fallow Deer (*Dama mescpotamica* ♂), born in the Gardens.

## OUR ASTRONOMICAL COLUMN

SCHMIDT'S VARIABLE-STAR IN VIRGO.—On June 6, 1866, Schmidt remarked, east and south of Spica, a star which he at first estimated 4 m., subsequently 5·4, not found in Argelander's *Uranometria*; it was much better visible than *i* Virginis, the reddish-yellow fifth magnitude south of Spica. By observations during the next fortnight its light appeared to have slowly diminished, nevertheless on June 19 it was still visible with the naked eye, though there was strong moonlight. On examination of the catalogues, &c., it was found that Lalande estimated it 6·7 on May 10, 1795; Piazzi calls it 6·7 and 7 in the *Storia Celeste*, not 8 as in the printed catalogue: Bremicker entered it of the seventh magnitude on his Berlin chart, while Lamont calls it 8 m. in Zone 355, observed on May 22, 1846. Heis has it 6·7, while Gould says, "Var. $5\frac{1}{2}$–$6\frac{1}{2}$." Houzeau judged it a sixth magnitude at the date 1875·11. We have thus evidence that it has been pretty conspicuously visible to the naked eye, while, on the authority of Bremicker and Lamont, it has been at other times beyond average unassisted vision.

Schjellerup has raised a point of much interest in connection with this star. There has been a difficulty in identifying satisfactorily Ptolemy's 19th star in Virgo, which he calls a fifth magnitude ($\epsilon$ in his notation). Baily, in his notes to his edition of Ptolemy's Catalogue, published in vol. xiii. of the *Memoirs* of the Royal Astronomical Society, writes: "The star 68 Virginis agrees with the position given by Ptolemy; but it is difficult to make it accord with the description, as being in the 'latus sequens' of the quadrilateral figure." Schjellerup, in his translation of Sûfi, remarks: "A l'endroit où, selon la description détaillée que nous a fournie Sûfi, doit se trouver la $19^e$ étoile, il n'y à aucune étoile aujourd'hui visible à l'œil nu, selon *Uranometria Nova* d'Argelander, pendant qu'il s'accorde très-bien avec celui de Lalande 25086, étoile qui est entre la sixième et la septième grandeur. En faisant la revision de cette note, je me rappelai l'étoile variable au sud-est de $\alpha$ Virginis, dont nous a donné avis M. Schmidt dans le nr. 1597, *Astronomische Nachrichten*. Quelle ne fut ma surprise en m'apercevant de l'identité entre cette variable et la $19^e$ de Sûfi?"

This identification, however, is hardly so certain as may at first sight appear. Schmidt's star is in the Greenwich Catalogue for 1872, which gives its position for 1880·0—

Right Ascension 202° 4′·4 ... ... Declination − 12° 35′·9

Ptolemy professes to have reduced his catalogue to the first year of Antoninus, A.D. 138, though it is well known that his longitudes are in defect to the amount of about 1° for that epoch. Unfortunately, for the 19th star of Virgo, though the longitudes agree, the latitudes given in the various editions of the Almagest and by Sûfi are materially different. Baily has it − 3° 0′, with a note that in the Venice edition in Latin by Liechtenstein, in 1515, it is + 0° 20′, which he thought might arise, as regards the difference in amount, from mistaking $\gamma$ for $\gamma'$. While in the two manuscript copies of Sûfi (who adopted the positions of the Almagest, adding 12° 42′ to the longitudes) the latitude is − 1° 20′.

To reduce the Greenwich position for 1880 to the year A.D. 138, we have in the usual notation—

$$A = 168^\circ\, 47'{\cdot}3 \;\ldots\; A' = 191^\circ\, 0'{\cdot}8 \;\ldots\; \theta = 9^\circ\, 40'{\cdot}6\,;$$

with which the position for Ptolemy's epoch is found to be—

Right Ascension ... 179° 36′·0 Declination ... − 3° 5′·4;

and assuming the obliquity of the ecliptic to be 23° 41′·8, we have—

Longitude ... 180° 53′ Latitude ... − 2° 59′

The longitude of the 19th of Virgo is apparently 178° in all the editions of the Almagest, and the latitude differs 1° 39′ from that assigned in the manuscripts used by Schjellerup.